Superficial femoral artery branch avulsion after severe muscle cramping

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Avulsion of a muscular branch of a major artery without a history of major trauma has not been reported to our knowledge. Occasionally, blunt and even minor trauma can result in injuries that seem out of proportion to the level of injury. We report a case of an avulsed muscular branch of the superficial femoral artery in a patient with recent thigh cramping. This injury is likely related to the intense tetany the patient described having before he came to the hospital. (J Vasc Surg 1999;30:954-6.)

CASE REPORT

A 43-year-old man came to the emergency department with a 12-hour history of left thigh pain and swelling. He stated that he had been painting while standing on a ladder for 15 hours the day before. That evening, he had intense bilateral thigh cramping while lying down. Ambulation and massage helped the right thigh, but acute swelling and worsening pain developed in the left thigh. He came to the emergency department 12 hours after the onset of cramping, with an obviously swollen left thigh in a hemodynamically stable condition.

In the emergency department, a diffusely swollen left midthigh with intact normal pulses from femoral to pedal were revealed by means of a physical examination. The swelling was not pulsatile, and there was no obvious trauma. There were no associated clinical findings that suggested a compartment syndrome. The patient denied having any significant medical history, including a personal or family history of bleeding disorders. He denied taking anti-platelet drugs. The only association the patient could make was the temporal relationship of the bilateral thigh cramping with the swelling of his left thigh.

A hemoglobin concentration of 13.7 gm/dL and normal coagulation parameters, platelet count, and chemistries were demonstrated by means of laboratory evaluation. A vascular duplex scan was obtained, which demonstrated a large midthigh hematoma with no associated aneurysms or venous abnormalities. Incidentally, the superficial femoral vein was noted to be compressed by the hematoma, but was patent. A contrast-enhanced computed tomography scan was obtained, demonstrating a midthigh hematoma with prompt extravasation of contrast material suggesting an arterial source (Fig 1). An angiogram was then performed, demonstrating a torn small intramuscular arterial branch arising from the midsuperficial femoral artery (Fig 2). An attempt at selective catheterization and coil embolization was made, but was unsuccessful because of the small caliber of the vessel. Manual compression and a pressure dressing were applied, and the patient was observed in the intensive care setting.

A second duplex scan was obtained 2 days later, which demonstrated a small branch of the superficial femoral artery that was actively bleeding into a cavity approximately 1.0 by 1.5 cm in size (Fig 3), but the bleeding appeared nearly stopped because of the tamponade effect from the hematoma. Serial hemoglobin concentrations were obtained, and they demonstrated a stable level, at 9.4 gm/dL. As a means of follow-up, duplex examination the next day was performed. At this time, the sidebranch was demonstrated to have a high-resistance Doppler signal and a non-filling cavity suggesting occlusion of the avulsed end of the vessel. The patient was ambulating, and the swelling was subsiding. The evening before the patient's discharge was planned, he had shortness of breath and chest pain. A high probability for a pulmonary embolus was demonstrated by means of a pulmonary ventilation/perfusion scan, and the patient was anticoagulated. A superficial femoral vein thrombosis caused by compression from the hematoma was demonstrated by a venous duplex scan. Thrombolytic therapy was not considered to treat the venous thrombosis, because of a concern of re-bleeding from the arterial sidebranch. The patient was fully anticoagulated in the next few days and was discharged.

The patient returned approximately 1 week later with worsening pain and swelling of his left thigh, with associated numbness of the anterior and medial portions of the thigh and knee consistent with a saphenous neuralgia. Duplex examination revealed continued active bleeding from a sidebranch of the superficial femoral artery that was again filling a cavity within the hematoma, similar to Fig 3.

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Fig 1. Contrast-enhanced computer tomography of the left lower extremity in the midthigh region. There is an area of extravasation of contrast material (*small arrow*) in the vicinity of the femoral artery (*large arrow*). Because the intensity of the extravasated contrast is the same as that in the femoral artery, an arterial source was suspected.

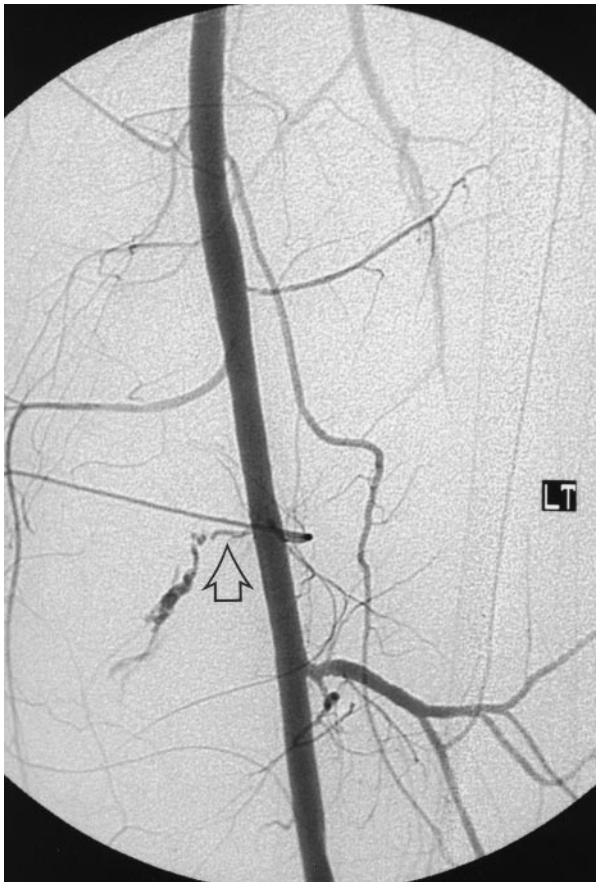

Fig 2. Diagnostic angiogram of the left lower extremity, demonstrating the superficial femoral artery and its muscular sidebranches. The *arrow* depicts an avulsed sidebranch with free extravasation of contrast material. An attempt at selective catheterization and embolization was unsuccessful, because of the small caliber of the vessel.

The avulsed vessel was identified by means of surgical exploration and then ligated. There were no obvious anatomical abnormalities in the superficial femoral artery or the transected branch. The hematoma was evacuated, and the patient was allowed to recover from surgery. He was discharged taking anticoagulants and was without shortness of breath. Again, thrombolytic treatment of the superficial femoral vein thrombosis was not considered, because of the concern of a hematoma re-developing in an acutely postsurgical wound. The patient was seen in follow-up and was recovering well, without further complications.

DISCUSSION

Avulsion of a muscular arterial branch caused by muscle cramping has not previously been described to our knowledge. Although it is impossible to prove that the severe tetany this patient experienced was responsible for the avulsion, no obvious recent or remote trauma that could account for the event that occurred was demonstrated by means of his history. There have been reports describing arterial injuries after relatively minor trauma,[1-4] including arterial dissections, pseudoaneurysm formation, and compartment syndromes. For example, an upper-extremity compartment syndrome has been reported after a patient sustained a contusion to the antecubital fossa.[3] However, an obvious source of bleeding was not demonstrated by means of angiographic analyses. Also, a deep femoral artery pseudoaneurysm was identified after a patient complained of extreme pain immediately after a golf swing.[4] It was postulated that the acute torsion caused a small tear in the deep femoral artery that subsequently became a pseudoaneurysm. Repetitive minor trauma can also result in vascular damage to the affected region. Hypothenar hammer syndrome is a well-described phenomenon in both manual workers[5] and professional baseball catchers,[6] and it results in deficits in arterial perfusion of the digits of affected hands. Traumatic pseudoanuerysms of small perforating branches have resulted after ankle sprains.[7] These present as acute worsening of pain and swelling at a remote time from the initial insult.

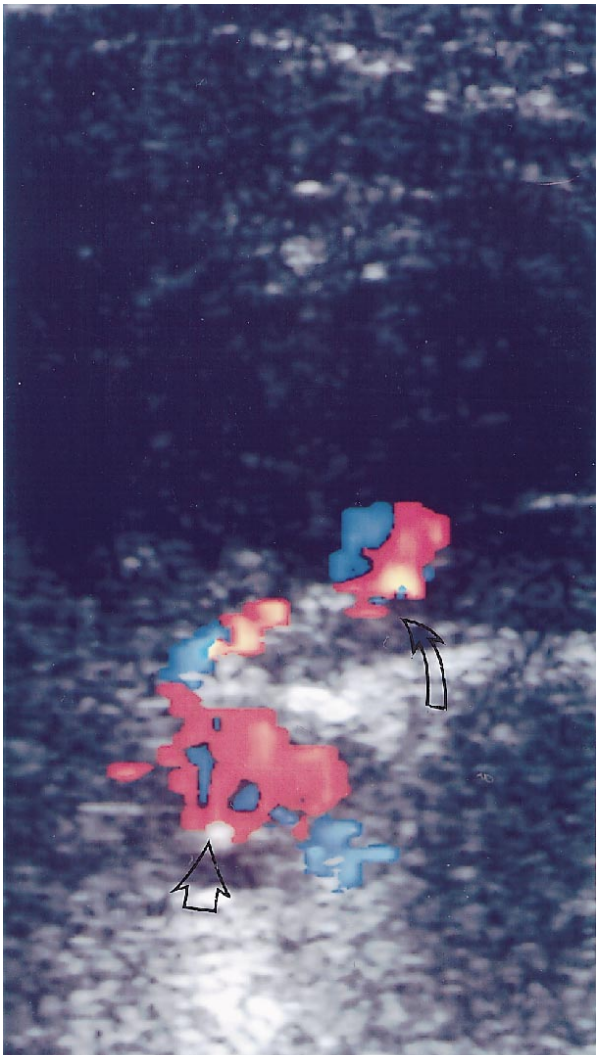

Fig 3. Transverse duplex imaging over the left midthigh demonstrates the superficial femoral artery (*large arrow*) and a region of active bleeding into a cavity adjacent to the hematoma (*small arrow*). The cavity identified had bidirectional flow, as depicted by the color spectrum analysis.

"Spontaneous" avulsion of the uterine artery has been described in at least four cases during pregnancy.[8-11] In the most recent case, the patient initially had preterm contractions, followed by increasing abdominal pain and anemia. On surgical exploration, the patient was found to have a transected uterine artery, with no apparent cause. No anatomical explanation, such as aneurysmal change, could be demonstrated.[11] Although pregnancy is known to induce changes in the intima and media of the arterial wall, it is possible that a uterine contraction could produce enough tension on the uterine artery to cause an avulsion. However, these authors did not consider this possibility.

The etiology of our patient's arterial injury remains unclear. It is difficult to speculate the origin of the arterial damage. It is possible that a congenital abnormality of the muscular sidebranch existed; however, this was not apparent macroscopically. Intense bilateral thigh cramping preceded our patient's description of thigh swelling. We suggest that the significant shortening of the muscle fibers from the tetanic state avulsed the small muscular branch from the superficial femoral artery. We believe that the deep venous thrombosis and subsequent pulmonary embolism were caused by venous compression. The symptoms of leg swelling with venous thrombosis were masked by the large hematoma. Earlier operative intervention, including hematoma evacuation and sidebranch ligation, may have prevented the superficial femoral vein thrombosis and subsequent pulmonary embolism in this patient. It may also have prevented the saphenous neuralgia.

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